Ultra-light disposable radio probes for atmospheric monitoring

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Ultra-light disposable radio probes for atmospheric monitoring

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Representation of clouds remains a latent ambiguity for weather forecasting and climate models since their characteristics depends on multidisciplinary processes in a wide range of natural scales, from the collision of micron-sized droplets and particles to the thousand-of-meters scale of airflow dynamics.
Within the Horizon 2020 Innovative Training Network Cloud-MicroPhysics-Turbulence-Telemetry (ITN-COMPLETE), the development of ultra-small light disposable radio probes for fluctuation-inside-clouds monitoring is promoted and financed. Being light-weighted (less than 20 grams), the probes will have a fluid-dynamic behavior to allow them to "float" inside warm clouds after been released by an aircraft or an Unmanned Aerial Vehicle (UAV).
Each disposable probe is equipped with compact size microprocessors (presently the first prototype uses Arduino© Nano), controllers, and a set of sensors for the measurement of atmospheric parameters such as velocity, acceleration, pressure, temperature and humidity variations.
All probes are part of the Internet-of-Things (IoT) world. In fact, while floating, they collect, store and then send the coded information to a base station located at the ground through a dedicated radio transmission link. It is to be noted that long-range communication link (10 km) should be assured with low power consumption technology: a network based on the Long Range Wide Area Network (LoRaWAN© protocol) to connect and exchange data within the end-modules and the base station is the potential adopted solution.
As far as possible biocompatible elements within the mini ultra-light radio probes will be used to avoid any environmental pollution.